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TEST REPORT

CONFIDENTIAL
(BURIAL PACKAGING)

On 8 June 1955, the first scheduled inspection of the Medical Supplies and Food Ration Caches was made by Messrs. [redacted] MO/PCD, and [redacted] TSS/ED. At this time, the material had been either buried or submerged for 174 days, eight days short from being just half a year. 25X1 25X1

The three caches were retrieved, inspected, and replaced in less than a day. No difficulties were encountered. The grass in the field [redacted] had grown tall this spring, and only a day or two before, it had been mowed by a base maintenance crew. In the course of mowing, they had removed the two wooden stakes serving as markers for the loam cache. (Shown in the photo on Page 5 of Attachment 2.) The bare plot of ground, covered partially by the new-mown grass and some plucky small weeds, was easily located and no time was lost. The stakes were replaced after cache inspection and reburial. 25X1

Of greatest interest at the six-month inspection was the percentage of failure, higher than anticipated in light of the fact that every item was given a quick-leak test. The failures are discussed at length in the individual cache breakdown which follows.

Individual Cache Breakdown

SWAMP CACHE

No difficulty was encountered in finding the swamp cache. The ground was mostly bare, covered with sparse vegetation in the form of weeds. Both marking stakes were in place.

The immutable swamp was as always: slimy, malodorous, and teeming with crabs. The cover boards on the larger box fell off during the exhumation, and care had to be taken to keep the box upright so that the smaller items would not fall out. A small pill bottle, once fallen into the muck of the swamp, is easily lost.

Five hot-dipped items failed here. There were 39 items in all, giving a 13% failure. (Those items that failed can be identified in the TSS/ED file copy report in Fig. 1 of Attachment 1. They bear a number "1" in red ink.) They are described below:

Morphine Tartrate Solution: This item was dipped over a small cardboard box wrapped in aluminum foil. Failure occurred along an edge where the plastic had formed a very thin coating over a sharp crease in the aluminum foil. The morphine is in a metal squeeze tube to which is fixed an injection needle sheathed in a glass tube.

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Partial protection was afforded by the aluminum foil in spite of the plastic failure. Extract from sterility analysis report: "The label was faded, the metal tarnished, and the needle separated from the tube when the cap was removed. Sample insufficient to check for contamination."

Aureomycin Ointment: In this case a metal squeeze tube with a plastic screw-on cap was dipped directly without prewrapping. It failed because the hot plastic loosened the paper label on the tube during dipping, causing the label to partly unwind and result in a thin coating of plastic at this point which wore through. Analysis showed the ointment to be both potent and uncontaminated.

Dressing Gauze: An air bubble covered by a very thin plastic film which subsequently broke open or was worn through caused this package to fail. Although water had entered through the perforation, the aluminum foil wrapping kept the gauze dry and maintained sterility.

Surgical Instruments: Two of the three packages containing surgical instruments failed. In both cases the failure resulted from the wearing through of a thin plastic coating over a sharp foil crease.

These packs apparently failed early in burial, for the aluminum foil was severly corroded. In the worst pack the foil was partially reduced to small flakes of aluminum oxide. The instruments were not corroded, due to the special surgical alloy used. There was no question about their non-sterility; nevertheless, they could be used after being re-sterilized.

Sodium Chloride Tablets and Camphorated Opium: These bottles, both from Box #1, were not removed because of failure but because the oiless hot dip did not adhere tightly to the glass and there were air pockets in between. Only the tablets were checked for potency (and found to be good) because the opium bottle was inadvertently run over by a truck. (These items are identified in Fig. 1, Attachment 1 of the TSS/ED file copy report by a red "½" with a red circle around them.)

Both wooden boxes required renailing before replacement in the swamp. Smooth finishing nails had been used ~~in~~ making these boxes, and it was found that many of these had loosened and fell out on their own accord. Those remaining could have easily been pulled out with a pair of pliers. In repairing the boxes, rough roofing nails were used. These should hold better but may corrode faster because they are galvanized.

The stenciled box numbers were still legible.

BRACKISH WATER

No difficulty was encountered in locating or retrieving the pond cache. It was recovered by hauling in the commo wire anchor line, removing the ballast and opening the box. The pine box was in good condition and reuseable without any beefing-up required. The stenciled number was legible.

Four packages failed here, giving a percentage of failure of 10%. Three other packages were pulled for routine checking.

Morphine Tartrate Solution: The small cardboard box was dipped directly. Many small air bubbles formed along the glued cardboard seam during dipping, and this was the cause of failure. No analysis was made for potency or sterility.

Aureomycin Ointment: The tube itself was dipped. The "double-dip" method was used in which the tube was held by hand and one end dipped, the plastic allowed to cool, the package inverted and the other end dipped. Failure occurred at the overlap. It was deduced from inspection that the tube was not held in the hot dip long enough during the second dip to partially melt the first dip and fuse the two layers together at the overlap. The ointment was analyzed and found to be both potent and uncontaminated.

Assualt Ration: The dip was applied directly over the cardboard carton. Leakage occurred because of double-dip joint separation and an air bubble hole. The tin cans inside were not rusted. Accessories (gum, cigarettes, matches, sugar...) packed in a sealed metal foil bag were in good condition. A pack of cigarettes inside the pack was opened and smoked. They were still fairly fresh and flavorful.

Accessory Pack for C-Ration: The wearing through of a thin plastic coating over a sharp corner in the aluminum foil prewrap caused this package to leak. The contents were in a sealed metal foil bag and were still dry.

Surgical Instruments: This was removed for a routine check on its sterility; the plastic coating appeared good. Analysis showed the hemostat to be sterile and ready for immediate use.

Aspirin Tablets and Codaine Sulfate Tablets: Pulled for routine inspection. Found to be potent.

After inspection, the cover was nailed in place, the ballast attached and the box thrown back into the pond.

LOAM CACHE

It came as no surprise to discover the loam cache contents better preserved than at either of the other two locations. This is the only cache which is predominately dry. The pine box was well preserved, the stenciled number very easily read.

Three units failed, giving a failure rating of 6%. (Those items that failed can be identified in the TSS/ED file copy report in Fig. 2 of Attachment 1 by a number "1" in red ink.) There were more individual units in this cache than in the others because the C-Ration kit was broken down and the contents dipped separately.

Morphine Tartrate Solution: Leakage occurred at an air bubble, but the aluminum foil wrap, plus the overall dryness of this cache, offered adequate protection. Excerpt from analysis report: Tube of Morphine Tartrate - 1/2 gr per 1.5cc. Tube contained only 0.8 cc. of expressible liquid and contained 0.35 gr. of morphine tartrate. This is equivalent to 0.66 gr. per 1.5 cc. indicating that some of the loss may have been by evaporation. Insufficient sample to check contamination."

Accessory Pack for C-Ration: An air bubble pin hole caused this pack to leak. The contents, consisting of a pack of cigarettes and matches, were in a sealed metal foil bag. The matches were damp, but they lit and burned.

Tin Can from C-Ration: Failure occurred at the can rim where the plastic coating was very thin and wore through. This is termed a failure, although the can itself was still in excellent condition and the contents (crackers) perfectly preserved.

General Observations

The 13%, 10%, and 6% failure percentages for the swamp, pond, and loam caches respectively were higher than anticipated. Each hot dipped item was checked against leakage before burial.

Three distinct causes for failure will be noted:

(1) Thin, easily worn plastic coating over a sharp alumimum foil crease or can rim.

(2) Thin plastic coating over air bubbles, paticularly when cardboard cartons are dipped directly.

(3) Lack of plastic fusion at the overlap in double-dipped packages. (Usually caused by the difficulty involved in dipping small packages.)

The first fault points out one disadvantage of dipping over aluminum foil. Immediately after dipping, the plastic coating is very clear and transparent, and it is difficult on some packs to judge the depth of coat, especially on sharp bends and creases. On the other hand, if the plastic does fail, a carefully made aluminum foil wrap about a package will offer good protection itself in a dry environment.

It was found during the dipping that it is next to impossible to avoid air bubbles ~~and~~ from bottles and cartons. However, air bubbles from cartons can be minimized by either wrapping the carton in aluminum foil or by throwing it away and dipping the metal squeeze tube directly. There is no easy method of preventing air bubbles escaping during dipping from glass bottles fitted with plastic caps.

When air bubbles do form, they must be very carefully gone over. Whenever the first hot dip coating is porous and contains many air bubbles, the package must be given a heavy second or even third coating to insure complete protection. As pointed out markedly by this inspection, the danger lies in having a package with an air bubble over which there is only a very thin covering of plastic which is easily penetrated.

When making the second dip on a double-dipped item, the package must be allowed to remain in the molten plast ic long enough and deep enough for the first coating to partially re-melt so that the second coat will fuse to it with an adequate overlap. Ordinarily, leaving the package in the hot dip for two or three seconds is adequate to insure a good bond.

It is anticipated that the percentage of failure will not rise appreciably above its present level for the eighteen-month duration of this program. The justification for this belief lies in the types of failure noted. Thin plastic coatings over sharp edges or air bubbles that are going to wear through will probably be worn through inside six months. Likewise for double-dipped items with poor fusion between the two coats.

The next inspection is scheduled for mid-December 1955.